Go-cart, kit for go-carts and apparatuses for controlling the run of a vehicle, for example a go-cart

The invention concerns a vehicle such as a go-cart, i.e. a generally one-seater vehicle comprising an engine fitted to a chassis that is used for amusement or competitive purposes, and a kit for go-cart and apparatuses for controlling the run of a vehicle, for example a go-cart.

Go-carts are known that are provided with a steering wheel that is rigidly connected to a steering column, through which the driver can give the go-cart a preset trajectory and further comprising pedal controls for actuating the brake and the accelerator, by means of which the driver can regulate running conditions. To drive such go-carts the driver must simultaneously use his or her hands, which act on the steering wheel, and his or her feet, which act on the pedal controls.

One defect of known go-carts is that disabled persons, who are unable to use their lower limbs with agility, cannot drive existing go-carts and avail themselves of the amusement afforded by said go-carts.

Furthermore, the steering column of known go-carts is arranged obliquely to the surface of the ground on which the go-cart is driven and the steering wheel extends along a plane that is perpendicular to the longitudinal axis of the steering column. As a result, the steering wheel is arranged along a plane that is oblique in relation to the driver, who is thus forced to drive the go-cart while keeping his or her wrists bent in relation to his or her arms. This position is rather uncomfortable and furthermore it does not enable the effort exerted on the steering wheel to be precisely administered, thereby impairing, especially in the case of prolonged driving, the accuracy of the trajectory and the stability of the vehicle.

A further defect of the known go-carts is that they are sometimes tiring to drive because excessive effort is needed

to turn the steering wheel in order to set the desired trajectory. This is particularly serious for persons with limited strength in their arms such as certain types of handicapped person.

EP 0919422 discloses a vehicle provided with a steering wheel that can be moved towards and away from the driver's body to actuate an accelerating device or a braking device. The steering wheel is fixed to one end of a column that can rotate in relation to a fixed support to enable the driver to steer the vehicle and can translate in relation to said support to interact with the acceleration or braking device.

One defect of the apparatus for controlling the run of the vehicle disclosed in EP 0919422 is that it cannot be fitted to already existing motor vehicles to make them suitable for being driven by persons unable to control their lower limbs. In other words, the apparatus disclosed in EP 0919422 does not enable an ordinary vehicle provided with pedals to actuate the brake and accelerator to be converted into a motor vehicle the direction and speed of which can be controlled completely manually.

Furthermore, as the column that supports the steering wheel can both rotate and translate in relation to a single support a distracted or inexpert driver who wishes to brake or accelerate may accidentally turn the steering wheel. In this case the vehicle is steered in an undesired manner, which diminishes running safety and may lead to dangerous accidents.

One aim of the invention is to improve existing go-carts.

A further aim of the invention is to make existing go-carts suitable for being driven in a relatively easy manner also by disabled persons who are unable to use their lower limbs.

Yet another further aim of the invention is to make the driving position more comfortable for the driver, especially as far as gripping and handling the steering wheel is concerned.

Another aim of the invention is to decrease the effort required to rotate the steering wheel of the go-carts.

Another further aim of the invention is to enable an ordinary motor vehicle to be transformed into a motor vehicle the speed of which can be controlled manually in such a way as to make it suitable for being driven by disabled persons or beginners who are incapable of precisely coordinating the actions of hands and feet.

Yet another further aim is to provide a vehicle the direction and speed of which can be controlled manually, and wherein the risks of accidentally turning the steering wheel when one wishes only to brake or accelerate are reduced.

According to a first aspect of the invention, a go-cart is provided, comprising steering means, suitable for directing said go-cart along a given trajectory, and speed control means, suitable for modifying the running speed of said go-cart, characterised in that, said speed control means is so configured as to interact with said steering means.

This aspect of the invention enables disabled persons, especially persons who are unable to use their lower limbs with agility, to drive easily even go-carts because they can use the steering means to also adjust the speed control means. The same parts of the body, e.g. the hands, that by means of the steering means set the trajectory of the go-cart can therefore also actuate the speed control means, eliminating the necessity to use different parts of the body, e.g. the feet, to control the speed of the vehicle.

According to a second aspect of the invention, a go-cart is provided, said go-cart being provided with steering means comprising steering column means and steering wheel means by means of which a driver can set a trajectory for said go-cart, characterised in that, between said steering wheel means and said steering column means joint means is placed, said joint means being suitable for enabling said steering wheel means to

be positioned according to a tilt that is substantially independent of said steering column means.

The joint means enables the steering wheel means to be provided with a tilt that is different from that of the steering column means in such a way as to give the steering wheel means a tilt that is comfortable for the driver, e.g. by arranging it on a plane that is almost parallel to the driver's chest. The driving position is thus significantly more comfortable and enables the driver to drive the go-cart even for very long periods without feeling discomfort in the arms or wrists.

According to a third aspect of the invention, a kit for a vehicle is provided, comprising braking control means suitable for actuating braking means of said vehicle, and acceleration control means suitable for actuating acceleration means of said vehicle, said braking control means and said acceleration control means being so configurable as to interact with steering means of said vehicle.

This aspect of the invention enables a traditional vehicle such as a go-cart to be modified by equipping it with braking control means and acceleration control means that can interact with the steering means of the go-cart. By so doing, by intervening on the steering means the driver can modify the vehicle speed according to vehicle running requirements without having to use parts of the body other than those that act on the steering means. This is of great use for disabled persons, who, owing to this aspect of the invention, can convert a vehicle of traditional type, which they would not be capable of driving, into a modified vehicle that they can drive by using for example only their hands. There is no need to emphasise that the kit according to this aspect of the invention enables considerable savings to be made compared with the expense required to construct a new vehicle suitable for disabled persons, for example a go-cart.

According to a fourth aspect of the invention, an apparatus for controlling the run of a vehicle is provided comprising steering means provided with first steering column means slidable in relation to second steering column means in order to modify the speed of said vehicle, and further comprising position sensor means suitable for detecting the axial position of said first steering column means in relation to said second steering column means.

The position sensor means enables the axial position of the first steering column means to be accurately detected in relation to the second steering column means in such a way as to be able to associate in an extremely precise manner a preset acceleration or braking intensity with each position of the first steering column means. It is thus possible to obtain a vehicle that can be controlled in an extremely precise and reliable manner using only the hands.

According to a fifth aspect of the invention, a go-cart is provided comprising steering means through which a driver can set a trajectory of said go-cart, said steering means comprising control means arranged for modifying the position of wheels of said go-cart according to a command of said driver, characterised in that, said control means comprises hydraulic drive means arranged for hydraulically modifying said position.

The hydraulic drive means enables the trajectory of the go-cart to be set in a particularly easy manner and without exerting excessive effort. Thus, even persons with little strength in their arms such as handicapped persons can drive the go-cart.

According to a sixth aspect of the invention, an apparatus for controlling the run of a vehicle is provided, comprising steering means suitable for enabling said vehicle to be directed along a given trajectory, and speed control means, suitable for modifying the running speed of said vehicle,

characterised in that, said speed control means comprises articulated quadrilateral means actuatable by said steering means.

The articulated quadrilateral means provides a constraint for the movement of the steering means when the latter is used to actuate the speed control means. The involuntary movements of the steering means are thus avoided, which could cause involuntary modifications to the trajectory whilst the driver is braking or accelerating.

Furthermore, the articulated quadrilateral means enables the speed control means to be actuated in a particularly effective and reliable manner.

According to a seventh aspect of the invention, an apparatus for controlling the run of a vehicle is provided, comprising steering means, suitable for allowing said vehicle to be directed along a given trajectory, and speed control means, suitable for modifying the running speed of said vehicle, characterised in that, said speed control means comprises first shaft means slidably coupled with second shaft means and actuatable by means of said steering means.

Owing to the slidable coupling between the first shaft means and the second shaft means, it is possible to transform the traditional vehicles, provided with pedal-operated acceleration or braking means, in vehicles wherein the speed can be controlled by the steering means. To do so, it is sufficient to slidably couple the second shaft means with which an ordinary vehicle is equipped with an appropriately preset first shaft means.

The invention will be better understood and carried out with reference to the attached drawings, which illustrate some exemplifying and not restrictive embodiments thereof, wherein:

Figure 1 is an interrupted perspective view of a go-cart according to the invention;

Figure 2 is an enlarged and interrupted perspective view of braking means with which the go-cart of Figure 1 is provided;
Figure 3 is an enlarged and interrupted perspective view of support means of the braking means of Figure 2;
Figure 4 is an interrupted side view of steering means associated with speed control means, in an alternative embodiment;
Figure 5 is an enlarged section taken along the plane V-V of Figure 4;
Figures 6 and 7 show an enlarged detail of the braking means, in two differing operating configurations;
Figure 8 is a view like the one in Figure 4, showing acceleration means with which the go-cart is provided,
Figure 9 is a partially sectioned and interrupted view of the steering means of Figure 4;
Figure 10 is a partially sectioned and interrupted view of steering means provided with a removable steering wheel;
Figure 11 is an interrupted side view of steering means provided with lever means arranged for actuating speed control means in particular operating conditions;
Figure 12 is a front view of a steering wheel provided with the lever means of Figure 11;
Figure 13 is a diagrammatic and interrupted side view of a go-cart provided with a hydraulic drive system;
Figure 14 is an interrupted and partially sectioned view from above of the steering means of a motor vehicle;
Figure 15 is a side view from the left of the steering means of Figure 14;
Figure 16 is a side view from the right of the steering means of Figure 14;
Figure 17 shows an electric diagram of acceleration means suitable for being fitted to a motor vehicle.

Figure 1 shows a go-cart 1 comprising a chassis 2 on which wheels 3 are rotationally supported, said wheels 3 being

arranged for allowing the go-cart 1 to move along a road, track or any other route. On the chassis 2 a front bumper 4, two side bumpers 5 and a guard 6 are fitted that are suitable for protecting the chassis 2 and other mechanical parts connected to it in the event of the go-cart 1 knocking into other go-carts or obstacles placed along the track.

A seat 7, which is also supported on the chassis 2, enables a driver to be accommodated who controls the go-cart 1 by using steering means 8 that is provided with a steering wheel that is not shown. The steering means 8 further comprises a sleeve 9, that is connected as one with the steering wheel, the sleeve 9 being axially slidable in relation to a shaft 10. A prismatic joint, that is not shown, comprising for example a grooved surface made inside the sleeve 9 suitable for shapingly coupling with a further grooved surface made on the shaft 10 enables the sleeve 9 to translate along the shaft 10 whilst preventing relative rotation.

The shaft 10 is coupled by a joint 11, e.g. a cardan joint, to a steering column 12. The variation in the angular position of the steering column 12, due to rotation of the steering wheel, enables the position of the wheels 3 to be varied to modify the trajectory of the go-cart 1 using prior-art kinematics.

The joint 11 enables the tilt of the shaft 10 and therefore of the steering wheel to be modified in relation to the steering column 12 in such a way that the shaft 10 is in a position that is almost parallel to the ground on which the go-cart 1 is driven. Thus, the steering wheel, which lies on a plane that is substantially perpendicular to the longitudinal axis of the shaft 10, is almost parallel to the driver's chest. The driving position of the go-cart 1 is thus considerably more comfortable than that of the prior-art go-carts wherein the lack of joint 11 means that the steering wheel is perpendicular to the steering column 12 and forces the driver into an uncomfortable and unnatural position for his hands.

A ring 13 is fixed rigidly to the sleeve 9, which ring is provided with a first appendage 14 and a second appendage 15 and enables speed control means to be actuated, said speed control means comprising braking means 25 and acceleration means 43. The acceleration means 43 comprises a cable 16, connected at a first end thereof to the first appendage 14, and at a second end thereof to a valve, e.g. a throttle valve, which enables the mixture formed in a carburettor that is not shown to enter the engine actuating the go-cart 1.

To the second appendage 15 an actuating rod 17 is connected that is arranged to actuate the braking means 25, as shown in greater detail in Figure 2.

The actuating rod 17 is slidably engaged, near its end that is furthest from the second appendage 15, in an internally hollow stem 18 hinged on a lever 19 in a terminal area of the stem 18 opposite the actuating rod 17. The lever 19 may oscillate around an intermediate point thereof and is partially housed in the containing body of a pump 20 that is part of the braking means 25, so that the end of the lever 19 furthest from the stem 18 may actuate piston means that is not shown that is contained inside the pump 20. The latter sends a pressurised fluid, e.g. oil, into a brake circuit comprising a flexible conduit 21 that by means of a caliper 22 actuates two shoes 23 working with a disk 24 positioned on the motor axis 26 of the go-cart 1. Thus it is possible to make the drive wheels of the go-cart 1 brake, namely the rear wheels.

The pump 20 is fitted to the go-cart 1 by means of support means 27, shown in detail in Figure 3, comprising a bracket 28 provided with a horizontal support plane 29 from which an anchor wall 30 develops that is provided with two fixing holes 31. The pump 20 is positioned on the support plane 29 and is then pressed against the anchor wall 30 and fixed thereto by bolts 32 that engage in the holes 31.

The support plane 29 ensures that the pump 20 is maintained in a horizontal position during running, which makes it very difficult to absorb air bubbles within the pressurised fluid, which bubbles, being compressible, could diminish the effectiveness of the braking means.

The bracket 28 is provided at the bottom with two lateral diametrically opposed extensions 33 that may be fixed by further bolts 34 to two arms 35 fixed to the chassis 2 by means of clamps 36.

In an alternative embodiment, shown in Figures 1 and 2, instead of two lateral extensions 33, the bracket 28 can be provided at the bottom with two further clamps 38 that are fixed to a transversal bar 39, with which certain chassis types are provided.

To ensure that the pump 20 is kept in a position as stable as possible despite the vibrations that develop during the run of the go-cart 1 a stiffening element 37 is further provided that connects the top part of the bracket 28 to a front area of the chassis 2 so as to increase the bending and torsional stiffness of the bracket 28.

The go-cart 1 further comprises a support element 40 arranged to support the shaft 10, the support element 40 being fixed to the members 41 that bear the tank 42 of the go-cart 1.

To adjust the speed of the go-cart 1, the driver has to act on the steering wheel, pulling it towards or pushing it away from him or herself so as to cause it to translate in relation to the shaft 10. In particular, when the driver decides to accelerate he or she has to pull the steering wheel towards him or herself in such a way that the sleeve 9 translates in relation to the shaft 10 and the ring 13 together with the two appendages 14 and 15 fixed thereto shifts towards the driver's body. Thus, traction is exerted on the cable 16 that causes the valve of the carburettor to open, which valve lets the

mixture formed in the carburettor pass through towards the engine cylinders. The go-cart 1 is thus accelerated.

Near the carburettor a spring is further provided that takes the cable 16 to a rest position when the driver stops accelerating, i.e. stops pulling the steering wheel towards him or herself.

It should be noted that when the driver pulls the steering wheel towards him or herself this does not have any effect on the braking system because the shift of the ring 13 and of the two appendages 14 and 15 connected to it causes the actuating rod 17 to slide inside the stem 18 without having any effect on the lever 19 and therefore on the pump 20 that supplies the fluid into the brake circuit.

If, on the other hand the driver wishes to brake he or she must push the steering wheel away from him or herself in such a way that under the thrust of the second appendage 15 of the ring 13 the actuating rod 17 penetrates into the stem 18 until it causes the lever 19 to oscillate around its fulcrum. The lever 19 thus actuates the piston means of the pump 20 that supplies the fluid inside the flexible conduit 21, thereby tightening the caliper 22 and then the shoes 23 on the disk 24 of the braking means 25.

When the driver pushes the steering wheel away from him or herself to brake this does not have any effect on the acceleration means: by pushing the cable 16 the latter bends without modifying the configuration of the carburettor. The braking and accelerating actions are thus totally independent of each other.

In addition to building a new go-cart 1 that is configured according to the above description, it is also possible to convert a traditional go-cart to enable it operate in the manner explained previously. To do this it is sufficient to remove the steering wheel from the traditional go-cart, if necessary shorten the steering column 12 and fit an

appropriate adaptation kit on the traditional go-cart. This kit comprises the joint 11, which is fitted to the steering column 12 that may have been shortened, the shaft 10 and the sleeve 9, which is connected to the steering wheel. The shaft 10 is advantageously provided with the ring 13 and the two appendages 14 and 15 supporting the cable 16 and the actuating rod 17. The shaft 10 must furthermore be supported on the chassis 2 by means of an appropriate support element 40 that is part of the adaptation kit, and support means 27 of the pump 20 in relation to the chassis 2 must be provided. The above mentioned kit thus makes it possible, with a small number of simple operations, to pass from a go-cart wherein the brake and the accelerator are actuated by pedals to a go-cart the controls of which are completely manual.

In an alternative embodiment, shown in Figure 4, a go-cart is provided that is equipped with a steering wheel 44 to which the shaft 10a is fixed, which shaft is in turn connected to the steering column 12 by means of the joint 11. As shown in Figure 9, the shaft 10a is received for a portion of its length inside a movable member 48. Between the shaft 10and the movable member 48 radial bearings 45 are placed owing to which the shaft 10a can rotate in relation to the movable member 48 when the driver turns the steering wheel 44 to point the go-cart in a given direction. Axial bearings 46 are further provided that are placed between the movable member 48 and respective stop elements 60, the stop elements 60 being fixed to the shaft 10a to prevent relative translation of the movable member 48 and of the shaft 10a.

The movable member 48 is connected to the chassis 2 by articulated quadrilateral means. In the embodiment in Figure 4, the articulated quadrilateral means comprises articulated parallelogram means provided with two pairs of rocker arms 47a, 47b hinged near respective first ends, on the movable member 48 inside which the shaft 10a is housed as shown in

detail in Figure 5. The second ends of the rocker arms 47a, 47b are hinged on a fixed support element 40' that is connected with the chassis 2. As shown in Figure 5, the two pairs of rocker arms 47a, 47b are arranged on opposite sides of the movable member 48 and of the fixed support element 40' in such a way that the movable member 48 is guided on both sides during its movement in relation to the chassis 2.

As shown in the enlarged detail in Figure 5, each end of the two rocker arms 47a, 47b is hinged on the movable member 48 or on the fixed support element 40' by means of respective pins 49, rotationally supported by means of respective further radial bearings 50. Further axial bearings 51 are further provided that enable the pins 49 and therefore the rocker arms 47a, 47b to oscillate in relation to the movable member 48 and/or the fixed support element 40' even if forces directed along the axis of the pins 49 are applied.

A L-shaped element 52 is fixed to an upper portion of the movable member 48, the L-shaped element 52 being in turn fixed to the braking means 25 and to the acceleration means 43. In particular, the actuating rod 17 of the braking means 25 is fixed to the L-shaped element 52 with ball joint means 53 placed inbetween. Said rod is slidable inside the stem 18 to actuate the pump 20 in the manner already described with reference to Figure 2.

It is to be noted that in the embodiment in Figure 4 a return spring 54 is further provided that is arranged to return the lever 19 to its rest position when the driver of the go-cart does not perform any braking action.

As shown in Figures 5 and 8, a plate 55 is also fixed to the L-shaped element 52 on which plate 55 an end of the cable 16 is locked, said cable 16 being sheathed along most of its route in a protective sheath 56 and actuating the throttle valve of a carburettor that is not shown.

When the driver pulls towards himself or herself or pushes away from himself or herself the steering wheel 44 the articulated parallelogram means limits the movement of shaft 10a in relation to the chassis 2. The two pairs of rocker arms 47a, 47b in fact limit the movable member 48 to travelling along a route according to which the axis of the shaft 10a always remains contained in the same vertical plane.

Said route is not completely straight but the resulting deviations therefrom can be compensated by the degrees of freedom introduced by the parts of the joint 11, by the articulated joint 57 arranged between the steering column 12 and the chassis 2 and by the further articulated joint 58 placed between the steering column 12 and the connection point P of the tie rods that make the wheels steering. In particular, the articulated joint 57 and the further articulated joint 58 enable the end of the steering column 12 furthest from the shaft 10a to be lifted and lowered in relation to the chassis 2 when the steering wheel 44 is moved axially without impairing correct operation of the steering device connected to the steering column 12.

Apart from these differences, the operation of the embodiment shown in Figures 4 to 8 has many similarities to that of the embodiment shown in Figures 1 to 3.

In particular, when the driver draws the steering wheel 44 towards himself or herself the steering wheel 44 exerts traction on the cable 16, which opens the throttle valve of the carburetter. The vehicle is thereby accelerated. The braking means 25 remains inactive during this phase because, as shown by the arrow F1 in Figure 6, the actuating rod 17 is displaced inside the stem 18 in such a way as to move away from an abutting element 61 that is fixed to said stem, which remains in a fixed position. Consequently, the lever 19 remains in its rest position.

On the other hand, when the driver pushes the steering wheel 44 away from his or her body, the actuating rod 17 is displaced inside the stem 18 in the direction of the arrow F2 in Figure 7, until it abuts against the abutting element 61. Continuing to push the steering wheel makes the actuating rod 17 move the stem 18 and the lever 19 with it, which actuates the pump 20. Fluid is then sent under pressure into the brake circuit and the vehicle brakes.

The acceleration means 43 is not actuated during this phase because after pressure has been exerted on the steering wheel 44 the cable 16 is bent back on itself without performing any action on the carburetter. A further spring 59 makes the cable 16 return, which takes the throttle valve back to its equilibrium position.

Also in the case of the embodiment shown in Figures 4 to 9 an adaptation kit can be set up by means of which a traditional go-cart can be transformed into a go-cart suitable for being driven without the driver's using his or her legs.

Furthermore, the actuation modes for the braking and acceleration means shown in Figures 4 to 9 and in particular the articulated parallelogram means can be used not only in a go-cart but also in a different type of motor vehicle such as an automobile.

In the embodiment disclosed in Figures 11 and 12 the steering wheel 44 is provided with manual actuating means for actuating the acceleration means 43, comprising a further lever 67. By acting on the further lever 67 the driver may exert traction on the cable 16. The further lever 67 is pivoted in a central portion thereof on a clamp element 69 fitted to a rung 68 of the steering wheel 44. The further lever 67 is provided with a broadened end on which the driver can act, for example, by using his thumb and with a further end to which an extension 70 of the cable 16 is connected, said extension 70 coming from the plate 55.

By pushing the broadened end of the further lever 67 towards the steering column 12, the further lever 67 oscillates around the respective fulcrum and the further end connected to the cable 16 rises towards the driver's body. Thus the cable 16 is placed under traction so as to open the throttle valve of the carburetter and accelerate the go-cart, without, however, moving the steering wheel 44 axially.

Owing to the manual actuating means, the driver can keep the go-cart stationary by pushing the steering wheel 44 away from his or her body in such a way as to activate the braking means 25 and at the same time accelerate the go-cart by means of the further lever 67. When the go-cart has accelerated completely, the driver can pull the steering wheel 44 towards himself or herself to release the braking means 25. As the engine is at this moment supplying all or a large part of its power, the driver can therefore obtain a particularly aggressive and competitive start for the go-cart.

Figure 10 shows a steering wheel 44' arranged to be attached to and detached from a shaft 10b connected to the steering column 12 by means of the joint 11. For this purpose quick connectors 62 are provided that are equipped with respective protruding parts 63 suitable for shapingly coupling with seats 64 made on the shaft 10b. The quick connectors 62 are inserted inside holes 65 made on a tubular end 66 that is one with the steering wheel 44', within which the shaft 10b is accommodated.

By means of very simple movements such as pressure or traction that may be accompanied by rotation, the quick connectors 62 can be removed from the seats 64 and enable the steering wheel 44' to be detached from the shaft 10b. This allows a disabled person with limited motor capacity to remove the steering wheel 44' in order to more easily access the driving seat or to alight from the vehicle more easily. When the driver is in the driving position the steering wheel 44' can be again fixed

to the shaft 10b by inserting the quick connectors 62 into the holes 65 and then into their respective seats 64.

It should be noted that the driver who alights from the vehicle can also take with him or her the steering wheel 44' that was removed from the shaft 10b, in which case the steering wheel 44' also acts as an antitheft device. In fact, the theft of a vehicle without a steering wheel is significantly more complicated than the theft of a vehicle provided with a steering wheel.

In the embodiment in Figure 10, the movable member 48 and the braking and acceleration means described previously are associated with the shaft 10b; it is nevertheless possible to also envisage a steering wheel that can be moved in the manner described above also in a vehicle wherein the braking and accelerations means are actuated by a pedal system.

The movable steering wheel can also be provided not only for a go-cart but also for another type of vehicle.

Figure 13 shows a go-cart provided with a hydraulic drive system. In the embodiment in Figure 13, the end of the steering column 12 furthest from the steering wheel 44 is associated with a known hydraulic drive box 72 with a further joint 71 placed inbetween.

Said box controls, according to known operating principles, steering of the wheels of the go-cart, by means of steering tie rods that are not shown that are connected to the further articulated joint 58 at point P as previously described.

Two pipes 73 come out of the hydraulic drive box 72, which pipes 73 are in turn connected to the delivery and intake ports of a further pump 74. The latter is actuated by belt means 75, moved by chain means 76 that is driven by the driving shaft of the go-cart.

In a further embodiment, the steering wheel is connected to a first steering column that is axially slidable in relation to a second steering column. For example, the first steering

column may be hollow in such a way that the second steering column can slide inside the first steering column. Similarly to what has been described previously, the driver can regulate the speed by pulling towards or pushing away from him or herself the steering wheel, but with a different actuating mechanism for the brakes or accelerator from what has been described above. Position sensor means is in fact provided that enables the position of the first steering column to be detected, i.e. the position of the slidable steering column, in relation to the second fixed steering column.

The position sensor means is connected with processing card means that processes the signal received from the sensor means and, depending on the position that the first steering column occupies in relation to the second steering column, actuates with a certain intensity the braking means or the acceleration means.

The position sensor means may comprise an encoder, the shaft of which is connected with a gear wheel cooperating with a rack fixed to the first steering column. Thus, when the driver modifies the axial position of the first steering column, and of the rack with it, the gear wheel is rotated and the change in its angle position is detected by the encoder, which transmits it to the processing card.

In a yet further embodiment the position sensor means may comprise means for reading an optical or magnetic band that is fixed to the first steering column means or to the second steering column means.

Figures 14, 15 and 16 illustrate an embodiment wherein the acceleration means comprises a position sensor 189, e.g. a potentiometer or an encoder. Said Figures show steering means 108 of a motor vehicle comprising a steering wheel 144 fixed to a first shaft 109 provided with a tubular end portion 180 that is slidable in relation to a second shaft 110. The latter is in turn connected, by means of a joint 111, to a steering

column 112 arranged to direct the wheels in the required direction owing to a known steering device. The second shaft 110 is externally provided with a grooved surface that is suitable for shapingly coupling with a further grooved surface made inside the tubular end portion 180 of the first shaft 109. This enables the first shaft 109 to translate in relation to the second shaft 110, at the same time preventing the relative rotation.

The first shaft 109 is rotationally supported on a ring member 113, by means of bearings 181 placed inbetween. The ring member 113 is furthermore configured in such a way that it can be translated as one with the first shaft 109. An appendage 182 is fixed to the ring member 113, on said appendage 182 the first end of an actuating rod 117 being hinged. The actuating rod 117 is arranged for actuating a braking device in the manner previously disclosed with reference to Figures 1, 2 and 4.

The first shaft 109 is fitted inside a fixed hollow element 183 connected to a support plate 184. On one side of the fixed hollow element 183 guide wheels 186 are fitted between which a bar 187 may slide, the bar 187 being one with the steering wheel 144.

On the side of the fixed hollow element 183 opposite the one that supports the guide wheels 186 a gear wheel 185 is fitted, the gear wheel 185 engaging with a sprocket 188 on the axis of which a position sensor 189 is fitted. The toothed gear 185 is driven by means of a rack 190 fixed to a protruding element 191 that is in turn connected to the first shaft 109.

A microswitch 192 is further fixed to the fixed hollow element 183, the closure or opening of the microswitch 192 being associated with a reference position of the acceleration means.

When the driver of the motor vehicle exerts steering action on the steering wheel 144, the latter rotates the first shaft 109

in relation to the fixed hollow element 183 and the ring member 113. The first shaft 109, owing to the coupling with grooved surfaces, in turn rotates the second shaft 110, which actuates, by means of the joint 111, the steering column 112 that controls wheel steering.

When the driver wishes to brake, he or she must push the steering wheel 144 away from his or her body, which steering wheel 144 translates as one with the first shaft 109, the ring member 113 and the appendage 182 fixed to it. The actuating rod 117 is then moved in such a way as to activate the pump of the braking means that pressurises a fluid arranged for tightening the shoes of the caliper of the brakes on a disk fitted to the driving axis in such a way as to decrease the speed of the vehicle.

On the other hand, when the driver wishes to accelerate he must pull towards himself the steering wheel 144, which moves as one with the rack 190, which rack 190 actuates the gear wheel 185 engaging with the sprocket 188. The position sensor 189 sends an electric signal corresponding to the position of the sprocket 188 to the data card 193, shown in Figure 17, and this signal is used to actuate an electric motor 194, e.g. a step motor, that modifies the position of the throttle valve 195 of a carburetter. In particular, the throttle valve 195 is opened by an amount that corresponds to the position of the sprocket 188 and therefore of the rack 190, which enables the driver of the motor vehicle to regulate the degree of acceleration according to factors such as traffic conditions, type of road being travelled on, road surface situation and so on.

The motor vehicle can furthermore be provided with safety sensors 196 that are for example provided on the front or back bumper to stop any acceleration commanded by the driver in cases wherein said sensors detect an obstacle arranged in their vicinity.

Finally, a vehicle provided with speed control means such as the one described in the previous Figures may also be provided with automatic or sequential speed gear.

The device in Figures 14, 15 and 16 can be provided in any motor vehicle in order to provide a system for controlling the direction and speed of the entire vehicle by means of the sole hands, which as such is particularly suitable for use by persons who are unable to use their legs.

In particular, the device in Figures 14, 15 and 16 can be used in a motor vehicle or a go-cart.

It should be noted that it is also possible to provide speed control means that does not comprise a steering wheel that is axially movable in relation to the steering column, but wherein the driver can manually activate braking means or acceleration means without shifting the steering wheel, e.g. by means of control switches.